

WINTER INJURY OF WOODY PLANTS

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Winter injury is not primarily a low temperature effect but rather the result of ice formation in the plant tissue.

How Killing Occurs: Ice crystals may occur both within the cells and between the cells. When ice forms within a cell, a change is brought about in that cell's protoplasm, and the protoplasmic membrane is made more permeable. Formation of ice crystals between cells draws water from within the cells through a process similar to plasmolysis. As ice expands between cells, there is a subsequent collapse of cells. Some authorities believe that the ice formed between cells is the primary cause of tissue death.

Winter Hardiness: Many perennial plants make changes in their metabolic processes to adjust to freezing temperatures. There is a reduction in free water and an increase in colloidal water. Water-soluble pentosans such as gums and pectins act as a holding force in the colloidal water. Some other materials which increase sap density are fat emulsions and nitrogen compounds.

Visible Types of Freeze Injury;

1. Leaf. Fig. (A).— Leaf damage may be curling, tip burn, or complete death starting from leaf edges.
2. Twigs. Branches and Trunk. Fig. (B).— These areas may have bark splitting and separation of bark from the cambium. Sunscalding may also occur.
3. Fruit.—Fruit may become shrunk due to collapse of cells.
4. Roots.—Roots that are damaged become discolored and will disintegrate; this is particularly true of young feeder roots that have not hardened off.
5. Cambium Layer. Fig. (C).—The most reliable index for freeze damage is the cambium layer. This layer occurs immediately beneath the bark and lies between the xylem (carrying water and mineral salts) and phloem (carrying plant food). Browning and a sour odor indicate damage.

What To Do With Plants Showing Winter Injury: When the cambial layer is seriously damaged the plant will most likely die. If only terminal parts of plants are killed, prune back to good wood. A stepped-up program of fertilization should be initiated when growing season permits, emphasizing nitrogen to replace lost wood. Special care should be taken to prevent disease and insect invasion of damaged areas.



Fig.(A) Leaf tip burn

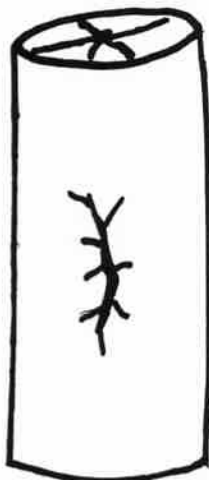


Fig.(B) Split bark

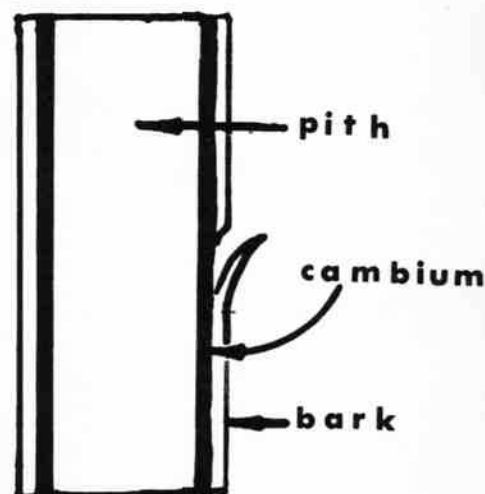


Fig.(C) Browning of cambium

References Used:

- Curtis, O. F. and D. G. Clark. 1950. An Introduction to Plant Physiology. McGraw-Hill Book Company, New York.
- Gardner, V. R., F. C. Bradford, and H. D. Hooker, Jr. 1939. The Fundamentals of Fruit Production. McGraw-Hill Book Company, New York.